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From the editor ..

Welcome to the October 2002 issue of *Learning Technology*.

The IEEE LTTF supported **International Conference on Computers in Education**, Auckland, New Zealand (December 3-6, 2002) is turning out to be a very high quality conference. The website of the event is http://icce2002.massey.ac.nz/. The 4-day conference is packed with more than 400 very high quality papers, tutorials, workshops and panels on various issues of educational technology. Keynote speakers include Allan Collins from USA, Tak-Wai Chan from Taiwan and Robert Lewis from United Kingdom.

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Besides, if you are involved in research and/or implementation of any aspect of advanced learning technologies, I invite you to contribute your own work in progress, project reports, case studies, and events announcements in this newsletter.

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Distance Teaching using SYIM educational environment

Abstract

The current paper describes the pilot application of SYIM educational environment in four Greek High schools. SYIM is domain independent educational environment for the provision of personalized educational services during asynchronous distance education sessions. Some of the findings are therefore discussed in the last section of the paper.

Introduction

Asynchronous distance education appears as one of the most appealing instructional delivery methods as it combines flexibility to access teaching material with time to reflect, self-study techniques with peer-to-peer collaboration, and the use of low-cost technology (Kalin, 1994; Hill 1997; Khan, 1997; Dillon and Zhu;1997; Bostock 1997; Harasim 1990, Holden and Wedman, 1993; Wulf, 1996).

The current paper describes application of a domain independent educational environment, called See Yourself Improve (SYIM), in four Greek High schools.

The core idea of SYIM is to help the tutors to monitor the individual learning needs and the misconceptions of the distance students and to keep a track of the feedback provided to each student. On the other hand, SYIM provides to the students the benefit of the intense supervision related to their individual learning needs and the effective support and guidance on how to overcome a misconception or remedy a performance gap in order to improve both their performance and their context comprehension (Tsinakos and Margaritis, 2001a).

Additionally, in the latter version, employment of Case Based Reasoning techniques as part of the SYIM reasoning component, aimed to automate the process of replying to the student's misconceptions, by identifying relevant misconceptions that have been already asked by other students and are stored in SYIM Educational Knowledge Base (Tsinakos and Margaritis, 2001b; Tsinakos and Margaritis, 2001c)

Application of SYIM

A pilot application of the SYIM was performed in a real asynchronous distance education session. SYIM was used as an intermediate communication component, between the tutor and the students. The tutor's suggestions and feedback regarding the student's progress were recorded by the SYIM, in addition to student's comments on personal learning problems or misconceptions.

The course context was "Introduction in DBASE programming" while the number of participants were twenty-five students spread among four High schools.
The invitation for participation was an open call for twenty five High schools students to voluntarily participate in a standalone distance teaching research program indicating that the official language for the program was English.

The participants had to fulfil five written assignments and to participate in five web based conferences in order to complete the course.

The aim of the current pilot program was to explore the efficiency of the SYIM educational environment regarding the following issues:

1. Encourage the use of tutor's feedback,
2. Facilitate student's supervision
3. Effective use of the Case Based Reasoning techniques, present in SYIM.

Figure 1 represents the program's scenario :

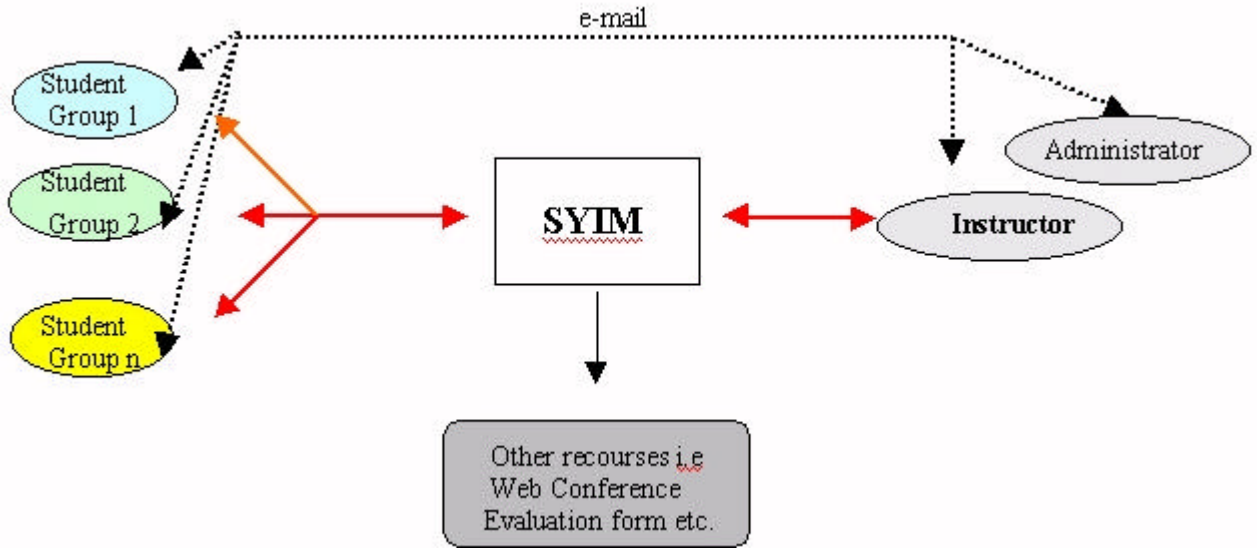

Figure 1: SYIM pilot session scenario.

In more detail:

- E-mail communication was mainly used by the students to submit their assignments to the instructor (as attached files) or to report (to the administrator) any kind of accessibility problems.
- Web based communication was used in order the students to access the context material, the Web conference which had been set up for them and the SYIM.

The SYIM program was used

1. By the instructor to provide evaluation on students ' assignments, on conference participation and for advice on how they should be improved or how to overcome a content-related misconception.
2. By the students to check on the instructor's evaluation comments regarding their personal progress or to post any kind of misconceptions they had.

By the end of the session each trainee had to complete and submit anonymously an evaluation form for the SYIM program.

Results and findings

All participants and the instructor provided a summative evaluation of SYIM, by completing anonymously, an evaluation questionnaire once the course was terminated.

The questionnaire had ten evaluation fields with the following Likert-type evaluation grade scale: 1 for Poor, 2-3 for Satisfactory, 4-5 for Good, and 6-7 for Excellent. There was also the "Non Applicable" (n/a) option in the evaluation grade scale. Furthermore, there was a field called "Additional comments and suggestions," where the evaluators could optionally submit their comments regarding SYIM.

A graphical representation of the average score of each evaluation field is presented in Figure 2

The fields of "Clarity of Instructions" (6.53 out of 7), of "Specificity of feedback" (6.46 out of 7) and of "Contribution in Context Comprehension" (6.42 out of 7) received the highest average rating while the fields of "Interest" and of "Speed of Access" were in the second place of highest average rating (Table 1).

Evaluation Criteria	*Average*
User Friently	6.115385
Easy of Navigation	6
Speed of Access	6.346154
Interest	6.384615
Specificity feedback	6.461538
Clarity of Instructions	6.538462
Use of Text	5.961538
Use of Graphics	5.561378
Contribution in Context Comprehension	6.423077
Interactivity	6.153846
TOTAL	6.194599

Table 1: Average results of feedback evaluation.

It is worth reporting briefly some of the additional comments submitted by the evaluators:

- Student 20 described SYIM as a " great work" and reports that it was a great idea to see mistakes in the assignments as a feedback and some comments or advises about improving them.
- Student 14 stated that had the chance to have all of his/hers questions answered, in contrast to the class-held lesson.
- Student 5 found SYIM an excellent idea for teaching and also indicates a drawback, not for SYIM but for the tutor, who did not answered some threads of the misconceptions part. On the contrary,
- Student 16 reported he/she liked the fact that could ask as many questions as wanted and they were answered in a very short time etc.

The instructor indicated, among others, that "…In general it a nice and simple program to use, since all my comments regarding each student's performance or queries are easily browsed and reviewed." Additionally, the instructor indicated the usefulness of the CBR techniques embodied in SYIM since many students' queries were automatically answered by the system.

Discussion

SYIM was pilot tested in a real distance education context, for research purposes, in order that the usefulness of the model could be tested in a preliminary way. Both the students and the instructor positively accepted SYIM.

The fact that the fields of Clarity of Instructions", "Specificity of feedback" and of "Contribution in Context Comprehension" received the highest grading, was most encouraging, as the SYIM aims to help students achieve better context comprehension, improve their work, encourage the use of tutor's feedback, and facilitate supervision of students.

According the finding of the current pilot session SYIM prooved to be a critical component of the asynchronous session by both the instructor and the students.

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Transforming Greek educational High School Model using Systems Thinking Analysis

Abstract

In an effort to depict problems or limitations that occur in Greek educational system and provide possible solutions, this case study attempts an application of Systems Thinking Analysis (Banathy 92) on the Greek High School Model (GHSM).

Introduction

Systems Thinking Analysis has been extensively used by a variety of researchers (Ackoff, 1999; Banathy, 1992-96; Laszlo, 1996; Laszlo, 1999; Frick, 1991-93; Steiner, 1988) who made attempts to effectively redesign or reorganize educational systems in order to create new ones that looked totally different from the traditional ones.

According to Banathy (Banathy 1992), the three Models that Portray Education as a System are:

1. Systems-Environment Model
2. Functions-Structure Model
3. Process-Behavioral Model

In the current paper, the Greek High School Model (GHSM) is considered as an Education Activity System and the lens approach of the Function/Structure Model will be used for this analysis.

Function/Structure Model of GHSM

This lens contributes to the construction of a still picture of the GHSM (what the system is at a given moment). To achieve this, the system's functions and the components carrying those functions will be provided.

Functions of GHSM

In order GHSM to attain its purposes, a variety of functions are used. In this section two cases are going to be examined. The first one regards the existing set of functions that are carried out by the GHSM and the second one is related to the functions that supposed to be carried aiming to better achievements.

The existing functions that are carried out are (the referred order is irrelevant to the significant of the functions):

1. [STR] : Student Training
2. [IwG] Interaction with the Government
3. [TFE] Teachers Further Education.
4. [CSI] Cooperation among Schools and Institutions.
5. [IwE] Interaction with the Environment
6. [AMER] Acquire and Maintain Educational Resources
7. [STP] STaff Payments
8. [STE] STaff Employment.
9. [TP] Teaching Process.

Their organization in a system of functions and the corresponded interrelations among them, are given in Figure 1. Note that bi-directional effects are represented by a double-ended arrow, while one-way effects with a single arrow.

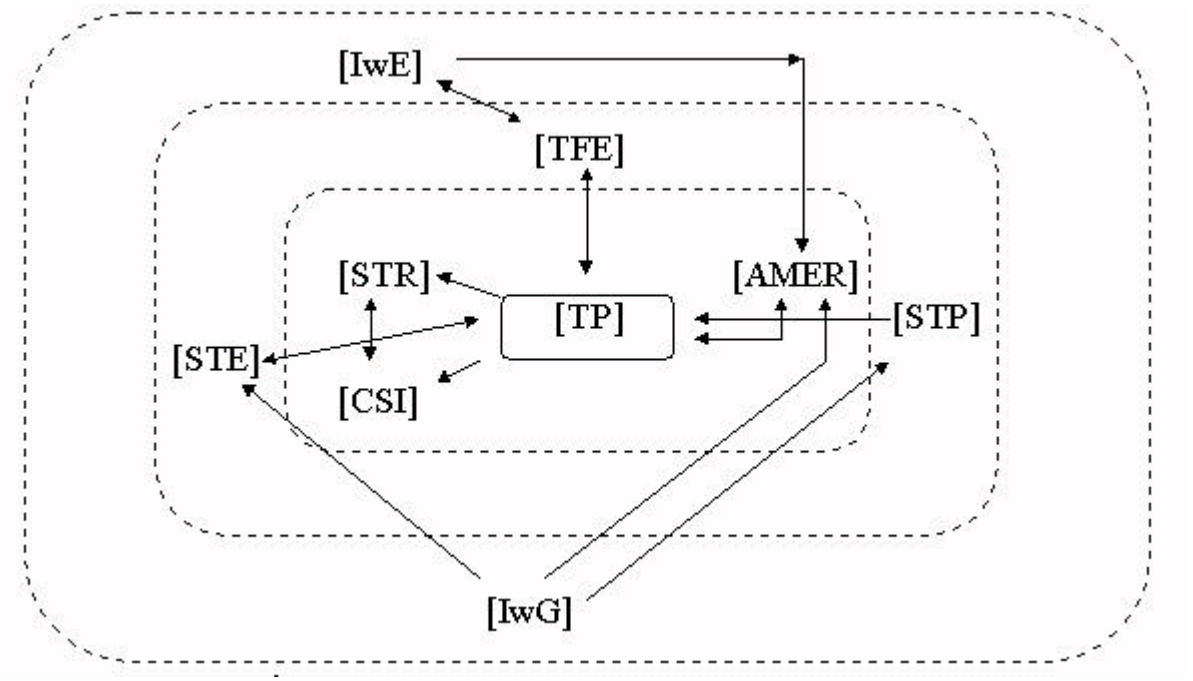

Figure 1: The current picture of GHSM

The above figure depicts the current interrelations of the existing functions of GHSM. It can be noticed that as a central function is considered the Teaching Process, which effect the Students Training in one-way direction. In many cases the process of preserving the adequacy of the teaching time table is considered as the most crucial process. The week schedules are designed with out considering students needs. For example it is very often to find the gymnastic course being the last one, in a seven hours day schedule, when most of the students are already exhausted. Teaching process is barren of students' feedback and in many cases it is imperious. Even in cases of cooperation among schools, students remain voiceless. STaff Payments and Employment are decided directly by the Government again in a one-direction mode. Similar status exists in case of Educational Resources Acquisition and Maintenance. In these cases, the valuable feedback of the teachers' environment remains inactive. Additionally it is worth-noticed, the luck of interaction among the Government and the Environmental society [IwE]. On the other hand there is a strong interaction between the latter and the functions of Educational Resources Acquisition and Maintenance and the Teachers Further Education. Teaching Process is highly effected by the function of Further Education. Teachers are able to propound issues on which further education in required and improve in such way their teaching and knowledge potentials and skills.

The case of a "should be" picture is presented in Figure 2. In this case the new functions are in blue color and the new interrelations are colored in red. The new functions that are inserted in this case are:

10. [CUK] Continuous Update of Knowledge.
11. [CDGP] Continuous Definition of GHSM Purposes.
12. [DMQL] Develop and Maintain high Quality of human Life.

It is obvious that here the Student Training is considered a the central function of the GHSM . Students now are the central system's consideration and their voice is taken in account as far as the teaching process and the cooperation is concerned. In that way students are transformed to active members of GHSM they take responsibilities and raise initiatives. The high level of interrelation (in both ways) with all the other crucial functions (such as Teaching Process), ensures a better approach towards the achievement of the GHSM purposes.

Additionally the function of the Continuous Update of Knowledge has positive effect on the formulation of the issues of further education, resulting to the Teacher Process betterment. The latter is also refined via the function of Continuous Definition of GHSM Purposes, adopting and reflecting in that way a more update image of education. Two of the most crucial points of the should be picture are the influence of the environment to the Government and Governmental acts via the function of Development and Maintain of high Quality of human Life

Consequences of the environmental influence toward the Government will be further discussed on the following section. On the contrary the insertion of the function of the Development and Maintain of high Quality of human Life as being an intermediary function towards the STaff Payment,

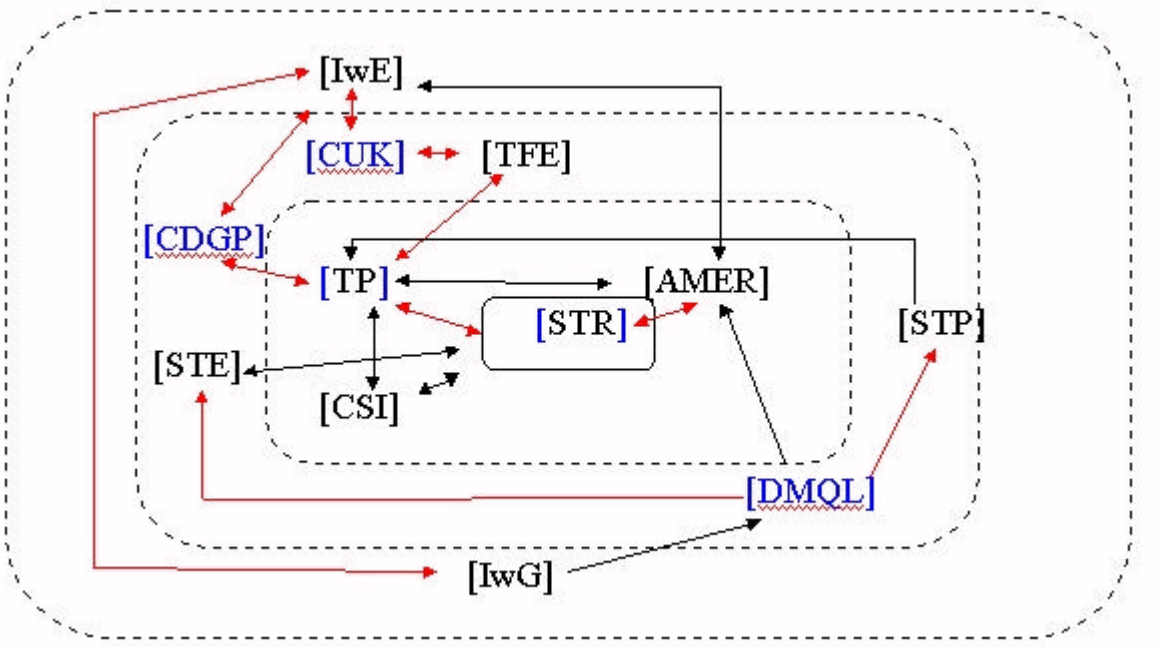

Figure 2: The "should be" picture of GHSM

Employment and of the Acquisition and Maintenance of Educational Resources, adds an additional safety valve to the improvement of the educational training process.

Conclusions

In now days GHSM is bogged down. Although its purposes are correct the lack of modern teaching methods and the absence of tight and "well tuned" cooperation among the Government the teachers and the generic environment result to the transformation of GHSM to an old fashion education model. To confront with these problems, GHSM should become more open to the environment, coevolve with it (adjust and transform in more flexible forms) and be ready to adopt and welcome new ideas and resources.

Both teachers and the Government should learn to pay attention to students' voices and needs, if they really want the GHSM to stay alive. Additionally the Government has to pursue collaboration with the teachers as the latter have an internal sense of GHSM problems and needs.

The above-described steps may assist towards the improvement of the given Educational system.

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Online Course Design for MBAs

Introduction

Online instruction may be superior to traditional methods under some circumstances (Ross and Schultz 1999). McCallister and Matthews (2001) suggest online MBA courses may be one such case, offering advantages over traditional MBA courses such as greater ability to instigate creative and critical thinking. Course design may determine whether online students reap these learning benefits.

The MBA course described here, Introduction to Assurance Services, was designed in accordance with constructivist learning theory. Assurance is an independent professional service that improves the quality of information for decision makers. Experts provide oral or written testimony that the assertion of another party meets (or does not meet) specified criteria or standards. Examples include whether a company follows a stated process for handling customer returns, whether credit card information is kept securely, and whether child labor is used to produce a product.

One source of improved learning is increased possibilities for using constructivist course design that exist with online classes. Constructivism is a theory on knowledge and learning. Its basic premise is that students can actively construct their knowledge by assimilating new information with prior knowledge (Bennett 2001). Constructivism emphasizes the learner's role in constructing meaning as opposed to simple transmission from teacher to student (Wilson and Lowry 2000).

This course followed the three core principles for effective use of the web in teaching (Wilson and Lowry 2000): access to rich information sources was provided, meaningful interaction with content was encouraged, and students were brought together to challenge, support and respond to each other. A variety of teaching techniques including lectures via online documents, web-based research, papers and online discussions were incorporated.

Unit One: Learning the Basics

Students bring their own experiences to learning situations, which helps them set the context for new knowledge (Grabinger 1996). Students in this class worked in all fields of business; an early assignment took advantage of these varied backgrounds and work experiences. Students held a class-wide discussion in which they posted examples of assurance services being used by their employers (along with a description of their current position and employer). Each student responded to at least one example, engaging in a discussion of the apparent usefulness of the example.

Interaction with a series of real events or examples has also been shown to help learners develop a deep level of competency (van Merrienboer 2001). Therefore, two lessons required an investigation of common applications of assurance: e-commerce and web site security. After examining web site security claims and similar uses of assurance, students wrote papers about the use (or the potential use) of e-commerce by their employers and the need for accompanying assurance information.

Next, the issue of social audits was highlighted. In a social audit, an organization's claims about its social policies are investigated. For example, a social audit may determine whether claims about the use of pesticides in production of a food product are accurate. Students read background information about social audits and then analyzed two companies' disclosures: The Body Shop Inc. and Citizen's Bank of Canada. Students held online debates about the usefulness and truthfulness of the disclosures.

Unit Two: Extending Knowledge to New Settings

In unit two students focused on socially responsible investment mutual funds' disclosures of investment criteria and related information. These funds attract investors by promising to make investments in companies that meet a defined set of social responsibility criteria. Students each investigated a fund that claimed to follow a social responsibility philosophy; no two students were permitted to investigate the same fund. The only restriction on fund choice was it had to be listed in either www.socialinvest.org or in www.socialfunds.com. Students' selections included religious-based funds, environmental funds and broader market funds.

The funds provided an authentic context for studying assurance. Students easily understood that assurance is needed to determine if the funds live up to their claims. Constructivist learning maybe more likely when knowledge is presented in a real-life context (Huang 2002), or involves experiential learning (Harper, Squires and McDougall 2000). This assignment provided both of these elements. Students wrote papers addressing the investment criteria for their funds, purposes assurance services might serve and the quality of the assurance information provided by their funds.

Conclusions

The use of constructivist principles in any learning experience is important for student learning, whether the course is taught online or in a traditional setting. There was a high level of interactivity between the instructor and students as well as among students as recommended in some prior research (e.g. Sampson, Karagiannidis and Kinshuk 2002). Students' individual backgrounds were used to enhance learning, as was the wide variety of information available online. Most assignments used Internet information and would not have been possible without its use. Students reported learning a lot from the assignments and did not seem to feel negative effects from the lack of face-to-face contact time.

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Experimenting with experiments: a new approach to audio laboratories

Introduction

In acoustics and audio, experiments are vital for the students to gain a good understanding of the topic areas. However, there are severe logistical difficulties in providing meaningful and timely experiments for the large numbers students studying these topics. The result is often a poor student experience, with a lack of correlation between lecture material and the associated experiment. A second problem is that there are a number of basic acoustic principles that are impossible to study in a standard laboratory because the acoustics of the room interfere with the experiment. One example is in a spatial perception experiment. The spatial position of a sound source is determined by the differences between the sound picked up by the left and right ears, as shown in figure 1.

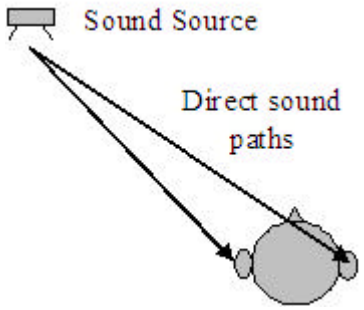

Figure 1: The ideal conditions for a spatial position experiment

If the experiment is carried out in a normal laboratory, sound reflected from the walls, floor and ceiling interfere with the sound coming directly from the source, as shown in figure 2.

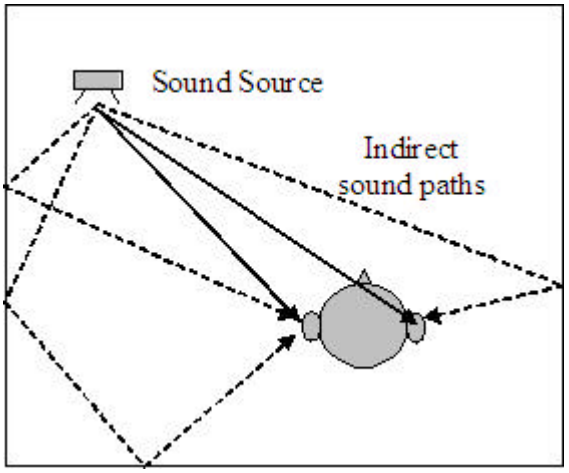

Figure 2: The problems caused by reflections in a laboratory

To avoid this problem, the experiment must be carried out in an anechoic room, where sound waves that hit the walls are absorbed, rather than reflected (figure 3). It is not possible for large numbers of students to have enough access to these facilities to carry out all the experiments that are required or desirable for a typical course.

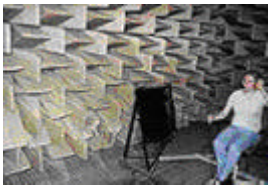

Figure 3: The University of Salford anechoic room

This paper presents an alternative approach which uses a computer to deliver sounds from a simulated anechoic environment to the student via headphones, thus ensuring that the acoustics of the room do not interfere with the experiment. The consequence of taking this approach is that the audio files can be delivered to the student over the internet.

Requirements

There were two sets of requirements for the project. At a subject specific level, the requirements were:

1. to allow the student to explore the basic principles of spatial perception
2. to allow the students to carry out the experiment at any time, within a fixed time block
3. to allow the students a single attempt to carry out the experiment
4. to provide a web-based mechanism for submission of work
5. to provide a web-based mechanism for assessment
6. to provide a web-based mechanism for student feedback

At a more general level, there was a requirement to generate a template for implementing web-based experiments or assessed coursework.

Generalised Scheme

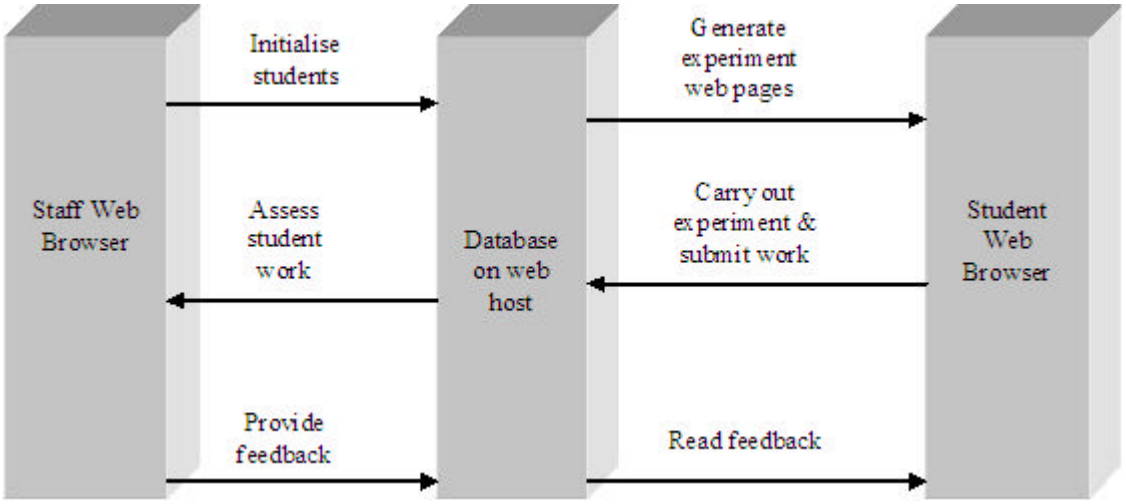

Figure 4: The general scheme

The general scheme is shown in figure 4. The system employs a database driven approach as this provides maximum flexibility. The staff member initialises the database for the student cohort. An individual student logs into the experiment. The experiment is presented to the student through their web browser. The student carries out the experiment on the web, with the input from the student (results, calculations, discussion) stored in the database. The member of staff then marks the work and provides feedback. Finally, the student logs in again after the assessment date to find their mark and read feedback on the submission.

Specific implementation details for the spatial perception experiment

The implementation of the spatial perception experiment is as a web site, but embedded within the Blackboard Virtual Learning Environment. The site uses a Microsoft Access database to store both the overall timeframe of the experiment and the details of each student. Students may only log on to carry out the experiment between the specified start and end dates. This ensures that the students carry out the experiment in the same time frame as the material is covered in classes.

They may log into the experiment as many times as they want and may carry out the individual sections of the experiment at any time within the overall timeframe. The students carry out a number of hearing tests based on spatial audio theory. They then carry out some calculations based on that theory and submit short discussions of their results. The submitted material is held in the database for assessment. Once a student has attempted a section, the section may not be repeated.

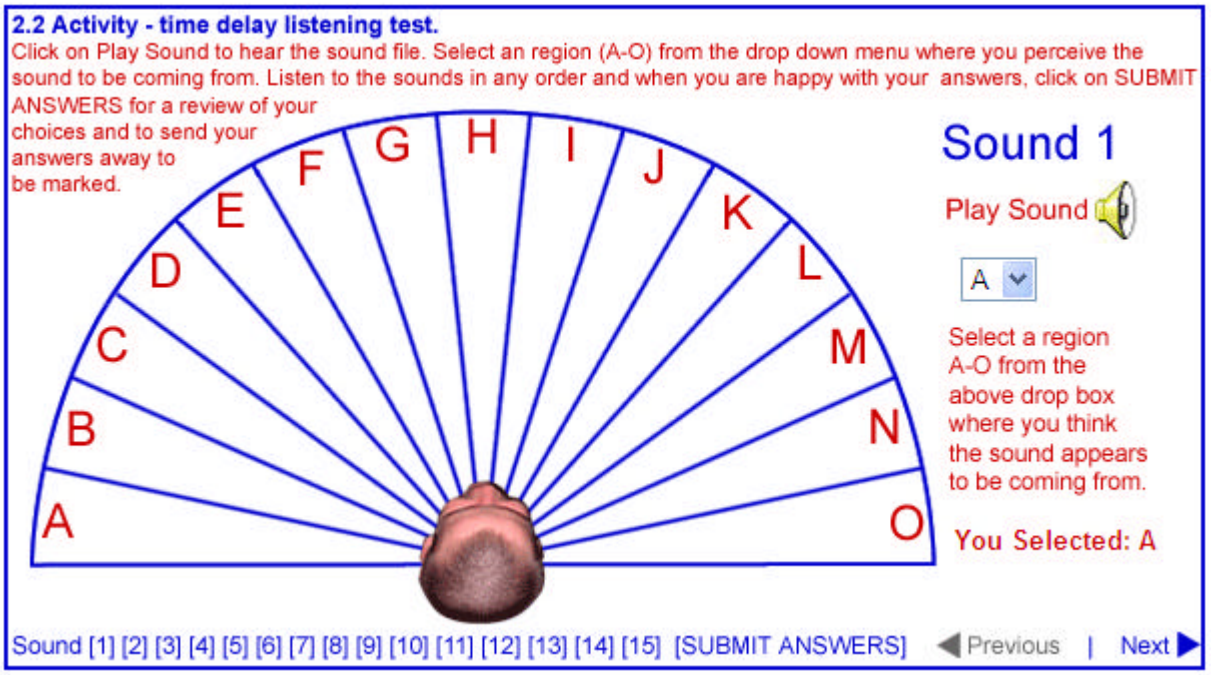

Figure 5: An example from the web-based experiment

At any time, the member of staff may log into the experiment to assess the students' work. For each student, their submission for each section is presented to the member of staff. The mark for each section and written feedback are stored in the database. The system calculates the overall grade for the student, including automatic capping of the mark for late submission. A mechanism is provided for the member of staff to override the automatic system, for example if a student has mitigating circumstances for late submission.

Finally, the student logs into the experiment again and retrieves both their overall mark and the formative feedback.

Conclusion

This system has been implemented and initial qualitative feedback is positive. There are advantages for both the students and the University. From the student perspective, there is an improved learning experience, with both the flexibility to carry out the experiment at the student's convenience, whilst also ensuring that all students have an opportunity to carry out the experiment at the time when the material is being covered in the class. From the University perspective, the experiment eases the congestion on physical resources. Complex timetables for laboratory schedules are a contributing factor to students missing laboratories, hence having a poor understanding of the topic and ultimately failing modules. As well as providing the opportunity for the students to carry out the experiment at the right time, the sophisticated tracking systems available in the Virtual Learning Environment enables easier tracking of student progress, whilst there is still time to take remedial action.

The significant disadvantage of this system is that the students have no contact with physical resources. Employers of graduates expect them to have used acoustic/audio test equipment and facilities. To avoid this problem, these students are still required to carry out physical experiments in other modules.

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Three Criticisms of the Online Classroom: An examination of a higher education online course in computer-mediated communication

Abstract

Technological expertise, access to technology, additional time associated with participation, and the changing role of the instructor a just a few of the many issues the online classroom has changed (and often times inhibited) the ways students learn (Baym, 1995, Berge & Collins, 1996, Harasim, Hiltz, Teles, & Turoff, 1996). The three largest issues found to affect the way students participated in a single graduate level online course, are described below.

Introduction

Online instruction holds many promises for adult learners. Through the use of the Internet, increased opportunities exist for (1) learning at a distance, (2) adhering to flexible learning schedules, (3) interacting with experts and peers one would otherwise never come into contact with, and (4) meeting the needs of varied learning styles. While the higher education online classroom offers many opportunities, it also presents a number of limitations. This paper briefly describes the three largest complaints found in the online course entitled, "Computer-Mediated Communication," offered through Columbia University's Teacher's College. In determining complaints, I gathered data from three main sources: (1) my own reactions to the class based on my experience in this class and others, (2) comments posted to the class discussion forums, and (3) results to a survey I sent to students in the class. These criticisms, described below, are listed from the most complained about aspect to the least.

1. Large Time Commitment

Too much time was the biggest complaint heard by students. Nearly every participant in the class commented about the large time commitment the course required. Most all of the students also seemed surprised at how much more time the online class took up over traditional face-to-face courses. In addition, I observed that nearly every participant was late in completing at least one assignment. In fact, many students were late multiple assignments.

> "Having taken previous online courses in addition to this one, I definitely feel that online courses, though they provide access otherwise not available, require much more of a time commitment than face-to-face classes. Not only do we have weekly assignments, but the added 'checking in,' dialoguing through the week, and often troubleshooting our technology is much more demanding than in a traditional classroom setting, where the class meets once or twice per week."

> "…We might think it would be more convenient to participate in class wherever and whenever we wanted by means of the Internet. However…we are not free of having a location in learing--in fact we are more hinged to one spot (in front of the computer), because it is there that we must do all of our work for the class (course exploration of web sites, class projects, particpation in the newsgroup, reading of submissions to newsgroup). It does also seem to take more time to accomplish all that needs doing for an on-line course."

2. Dealing with Technical Problems

Technical and access issues remained the second largest criticism and a major challenge to students, despite the best laid plans for designing this course. In this class, students knowledge of and access to technology varied greatly. This presented huge obstacles to students, some of whom experienced trouble accessing the course right from the beginning. Other students experienced problems at different points in the class, which often made their learning experience frustrating.

> "I'm a bit frustrated and caught by the technical setup and requirements. Feedback on the process of the course to date: We could have used the month of February to get this behind us. I have allocated 10 hours a week to this course, using a formula of three times the amount of face time, assuming a typical three hour per week class. My time has been eaten up by the technical setup. I'm having a technical glitch with my company firewall."

> "Ugh…I feel like I have overcome some HUGE obstacles just by getting into this newsgroup. The frustration and anger levels have been high and I have recently caught myself yelling at my computer."

3. Lack of Facilitation by the Instructor

Lastly, a lot has been written about the critical role the instructor plays in ensuring online courses are successful (Baym, 1995, Harasim, Hiltz, Teles, & Turoff, 1996, Jones, 1995). In this class, students really wanted, needed, and valued an active instructor, one who was visible online providing feedback to their work, supporting and questioning their statements, encouraging participation, and keeping the class on track. When not online for several weeks at a time, several classmates become disheartened. In response to the survey question, "What were you most disappointed/surprised by?" two students wrote:

> "The lack of interaction from the professor. We really only got 'guidelines' twice this semester which was odd. Given the topic of our class, computer-mediated communication with the professor should have been examined. …I never knew if I was 'wrong' or totally off-base."

> "…It's lonely out here in VirtualLand. …I am missing our teacher in this space. I understand his desire for a logos however I'm not exactly sure that this group in in syn and heading toward the same goal."

Conclusion

Indeed, we have a long way to go before the higher education online classroom is as successful as our face-to-face classroom. This will of course take time and perseverance. It will also take a critical evaluation of what is working and not working in each course we design, deliver, and participate in.

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Student Technology Assessment at the Global Level

Executive Summary

The goal of the Computer Literacy Project is to gain a better understanding of student perceptions on the nature of computer literacy. The Computer Literacy Project Survey was developed over the last three years as the foundation of research into advanced technology use in education research. I have been particularly interested in the nature of computer literacy at the university level and in differential notions of computer literacy across disciplines. The survey has been electronically distributed to universities in nine states in the U.S and five countries outside the U.S., see Table 1. This is the first time in the history of education research that such a systematic study on computer literacy has been carried out using the Internet and web-based technology that has reached international proportions. Reported here are preliminary results from two Australian universities, one university in Hong Kong and one university in the US.

Table 1. Computer Literacy Project Survey Distribution

United States	Arizona	Georgia	Michigan
	California	Illinois	Utah
	Florida	Indiana	Wisconsin
Other Countries	Australia		
	Hong Kong		
	Japan		
	Korea		
	Mexico		

There are at least six reasons that campuses have expressed interest in participating in the Computer Literacy Project: student technology assessment, accreditation, budgeting and planning for allocation of resources, curriculum development, comparative purposes, and as a deliverable service and product in grant proposals.

The Computer Literacy Project Survey is a set of 56 questions that cover use, learning, teaching, ethics, creativity, skills, personal opinions and demographics. I have devised an electronic communication and distribution infrastructure that allows for inclusion of diverse populations that can be geographically dispersed. I have two modes of survey distribution. One is primarily an automated process by means of the Internet and requires an on-site administrative contact. Ninety-two percent of my sites used the automated system. The second method is an intensive paper-based and Internet-based survey distribution coupled with focus group studies. This requires more personal contact with site personnel. The coupled distribution, e.g. both web-based and paper-based survey format, allows for inclusion of all technological levels of participants. This report discusses results from the electronic distribution method.

There is a three-tiered security system that ensures participant privacy of data and confidentiality. There is no direct connection between a participant and either their contact information or their particular survey responses. The password system allows distribution to as many cohorts as desired at each site. No data is shared with third-party vendors and all data is strictly confidential. Completion of the survey is entirely voluntary and no adverse effects occur between those invited and the institution. All survey protocols have passed extensive Human Subject Review Board examinations that follow federal NIH standards. This survey is aligned with the ISTE NET Standards for Students and Teachers and so is suitable for both the high school/secondary and university/post-secondary levels.

Current computer literacy studies are constrained by any of the following conditions: local to one site, emphasis on only skills-based knowledge, focus on one population, small sample sizes, and lack extension and comparability to other sites. The Computer Literacy Project Survey has been developed with these limitations in mind and set out to overcome them. The diverse set of questions examines more than just a set of skills, but looks at the techniques of literacy, e.g. exploring ethics, creativity, research use, learning preferences. The electronic medium allows for extension over geographically diverse sites using the same survey instrument. This medium, thus, allows me to increase my sample size and address

more complex research questions, for example, comparing disciplines between campuses and different educational levels. Web-based medium surveys offer unique advantages. Typical of other survey techniques, this new survey technology poses inherent challenges to the researcher, e.g. coverage and response rate.

Results

The survey results below are partial survey results from education programs at universities in Australia, Korea and the US. The results are aggregated and make no distinction between obvious groupings, e.g. distinctions between class level, ethhnicity, institution type, and gender. In addition, some divisions within a school may emphasize the use of technology more than other divisions and these surveys could be disaggregated as well, e.g. Library Science in education schools.

The first three tables provide demographic information on the students on age, gender and ethnicity. The Australian universities are predominantly undergraduates and the Hong Kong and US universities are predominantly graduate students. The Australian and US universities are 3:1 ratio of female to male and the Hong Kong university is about equally split between genders. schools are equally split between genders whereas education is 72% female. The Australian universities are 70% European background, the Hong Kong university is 90% Asian, and the US university is about 22% Asian and 50% European background.

There are 56 questions on the survey that ask about topics on computer access to hardware, software, Internet and email; training and learning preferences; ethics; creativity; subjective opinions about computers and literacy; and, self reported skill levels and skills assessment. The questions below are responses to computer use and learning preferences.

Q1. Age: (please specify the appropriate age range)

	Percent		
Age	Australia	Hong Kong	US
<26			25.4
26-30			25.0
31-40			31.4
41-50			10.7
>50			7.7
<22	71.0	14.8	
23	4.7	14.2	
24	3.7	11.5	
25-27	10.3	19.1	
28-33	4.7	19.7	
34>	5.6	20.8	

Note: $N_{Australia} = 107$; $N_{HongKong} = 216$; $N_{US} = 169$

Q2. Gender:

	Percent		
Gender	Australia	Hong Kong	US
Female	76.4	52.0	77.3
Male	23.6	48.0	22.7

Note: $N_{Australia} = 106$; $N_{HongKong} = 216$; $N_{US} = 163$

Q3. My ethnic background is: (select ALL that apply)

	Percent		
Ethnicity	Australia	Hong Kong	US
African	.9	.5	7.4
Asian/PacificIslander	2.6	91.0	22.0
European	70.7	3.7	49.0
Latin American	-	1.1	2.3
Mexican	.9	.5	6.3
Middle Eastern	1.7	.5	1.1
Native American	.9	.5	3.0
South American	-	.5	1.1
Other	22.4	1.6	8.0

NOTE: $N_{Australia}$ =116 responses, 107 valid cases; $N_{HongKong}$ =188 responses, 180 valid cases; N_{US} = 175 responses, 161 valid cases

In terms of computer use, Q4, 46% of Australian students used the computer on a daily basis, whereas 96% of the Hong Kong university and US university students used the computer on a daily basis. In terms of learning preferences, Q5, the most favored learning style is to work one-on-one with someone more knowledgeable. The second favored teaching style is to teach oneself and the third favored learning style is to take a class. Hong Kong students are more likely to use tutorial software. Australian and US students track each other on learning preferences and it may be of interest to explore learning preferences along gender or ethnicity differences.

Q4. I normally use a computer: (select ONE):

	Percent		
Rate	Australia	Hong Kong	US
Less than daily	46.0	3.0	5.0
Daily	54.0	97.0	95.0

Note: $N_{Australia}$ = 135; $N_{HongKong}$ = 216; N_{US}= 172

Q5. When it comes to learning computers, I would prefer to:

	Percent		
Rate	Australia	Hong Kong	US
Don't Want To Learn Anymore	-	.5	-
Teach Myself	26.2	34.3	26.2
Work One-On-One With Someone	44.0	35.2	47.1
Take Class	21.6	18.2	17.4
Use Tutorial Software	5.2	9.7	4.7
Other	.7	1.9	4.7

NOTE: N_{US}=172, $N_{HongKong}$ = 216, $N_{Australia}$ =131

The Computer Literacy Project Survey provides a wealth of information on computer literacy and can be used as a student technology assessment tool. The distribution of the electronic survey allows for national and global distribution and, thus, allowing for complex comparisons between various institutions and educational systems.

For more information about the Computer Literacy Project, see this URL site: http://www.secondsiteconsulting.com

If you want to survey your students or want more information on how to do so, then please provide contact and site information at this URL site: http://www.secondsiteconsulting.com/Survey/ContactInterface.cfm

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The Lab of Tomorrow Project
A Constructivist Approach in Science Teaching Through Emerging Technologies

The Lab of Tomorrow project introduces innovation both in pedagogy and technology. It aims at developing tools that allow for as many links as possible between teaching of natural sciences and every day life. It allows the student to link i.e. physics with "physis" (Greek word for nature), biology with "bios" (Greek word for life) and so on. Since science deals with the study of nature and the world around us, teaching science cannot be separated from daily experiences that result from student's interaction with the physical phenomena. The connection between tangible phenomena and problems provides students with the ability to apply science everywhere and not only in specially designed experiments conducted in laboratory controlled conditions.

In the Lab of Tomorrow project the re-engineering of the school lab of tomorrow is proposed along with the development of a new learning scheme based on the production of computational tools and project material that allow high-school students to use their every day life environment as the field where they conduct sophisticated experiments. The objectives of the "Lab of tomorrow" project are the following:

- Development of a pedagogical framework that allows for successful application of the emerging technology in everyday learning.
- Enhancement of constructionist approach in science teaching. The procedure of scientific inquiry is fully simulated and will allow for a deeper understanding of science concepts.
- Development of new educational tools and learning environments.
- Equal and parallel development of pedagogical and technological innovations. The aim is that the technological innovation is designed with educational targets and criteria.
- Development of a concrete evaluation scheme of the educational and technological aspects..

Within the framework of the project, wearable technology and a series of "artefacts", called axions, have been developed. The data collected by the axions are presented by advanced programming tools compatible with graphics and analysis software components, all integrated in a single User Interface, in such a way that students can easily investigate trends and patterns and correlate them with the theory taught at school (Figures 1&2b).

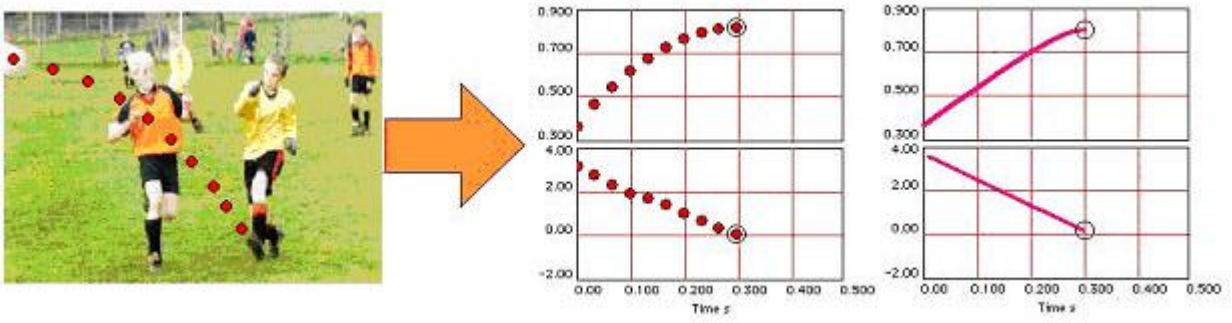
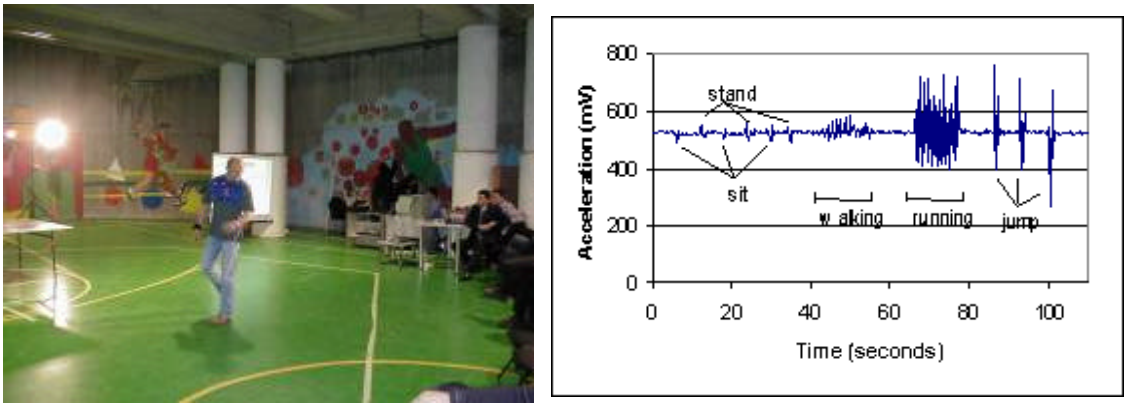


Figure 1: Teaching science through everyday activities. Scientific investigation as a process in which students can take part, day-to-day, creatively and pleasurably

The axions embedded in every day objects or in clothes are used in order to collect data during students' activities. Important factors of their design are ergonomics and economy. Artefacts like a ball that has a 3D accelerometer embedded represent innovative technological development of the project. A T-shirt (sensvest) with several wearable sensors (Figure 2a) is another state of the art deliverable. The sensvest has embedded a heart pulse meter, a temperature sensor, a body accelerometer and an arm accelerometer all interconnected with embedded wiring to a data local storage and communication board. The body accelerometer data in Figure 2b can be used for the qualitative study of several activities like walking, running, jumping etc. A leg accelerometer module capable of measuring both the acceleration and the step rate of the leg for extended time periods is another axion module developed within the framework of the project.

Finally a system called LPS (Local Positioning System) based on two CCD cameras is used for the location of 3D coordinates in space of selected objects with high accuracy. Sensor data from all axions are transferred wirelessly via the communication boards to a base station where they are stored.



a) b)

Figure 2. a) Wearing the sensvest. Several physiological parameters are recorded be the series of the sensvest sensors. b) Sample body acceleration data of the sensvest.

At the current stage of the project all axion prototypes are tested in the school environments of the participating countries. Following three months testing, the prototypes will be modified according to the remarks of the test run in order to be ready for the two final run phases of the project where this new approach in science teaching will be systematically implemented and evaluated.

Within the framework of the project the educational and technological aspects are investigated and worked on together in an open and exploratory fashion encouraging innovation. The new ideas, concepts and technologies will be tested and evaluated in relation to real school environments. In the Lab of Tomorrow project students and teachers will come together with researchers, psychologists, designers and technologists to re-engineer the lab of the school of tomorrow.

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LanguageMOO: A multi-user object-orientated domain for second language education

Advances in computer mediated communications (CMC) technologies have fostered the emergence of tools that enable synchronous communication. One class of these tools popularly known as MOOs, (multi-user domains object-orientated) utilize open source software to create learning environments in which users can interact synchronously and create virtual objects and content within the context of a virtual world. This paper will briefly examine the MOO concept and the context to the recent application of MOOs in language education. In addition this paper will delineate the early development of LanguageMOO, a MOO-based virtual environment designed to promote collaborative learning and second language acquisition.

MOO environments

The first MOO environments utilised telnet and were designed to enable real time text-based communication between users. The original MOO concept was further enhanced with the creation of the LambdaMOO core, which forms the basis of most MOOs currently used in education. The object-orientated nature of LambdaMOO brings a new dynamic to MOO development as this architecture enables educators to establish virtual communities in which users may communicate and create learning objects. In recent years this development, coupled to the creation of client software that provides access to MOOs via web browsers has made these environments increasingly accessible to language educators.

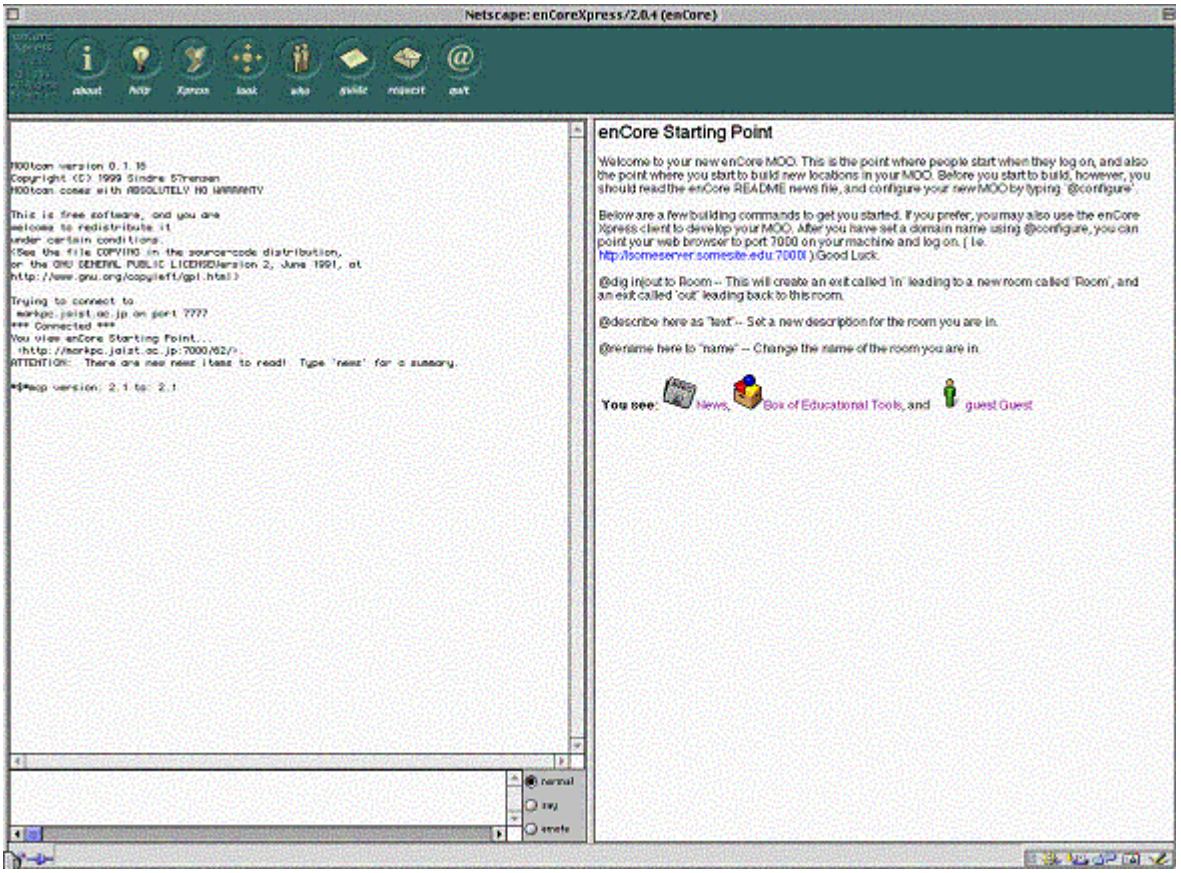
MOOs in language education

MOO environments have been applied to a number of domains however they have yet to be extensively utilised in

computer assisted language learning (CALL). Although research into the use of MOOs in language education is at early stage, the present literature suggests that participation in MOO-based learning may offer a number of advantages over conventional educational settings. Positive aspects of MOO-based learning include the removal of traditional constraints on learning such as time and distance and the absence of oral and visual cues that may inhibit communication. MOOs also provide students with access to a wider range of interlocutors than would have been possible in the past. MOO environments further offer the advantages of facilitating collaborative knowledge construction (Peterson 2001), and task-based learning (Shield et al. 1999). In bringing together diverse learner groups MOO-based learning may also promote the negotiation of meaning, a form of interaction long seen as an significant factor in second language acquisition (Pica 1994). At the same time MOOs offer unique opportunities to engage students in the learning process. Examples of these opportunities include the creation of personally meaningful artifacts and the development of dynamic communities of learning based on learner autonomy (Donaldson & Kotter 1999, Schwienhorst 2002). The remainder of this paper will examine LanguageMOO, a MOO-designed to facilitate second language acquisition and collaborative learning.

LanguageMOO: A virtual environment for language learning

LanguageMOO utilises the enCore environment developed by Haynes and Holmevik (2001). This system is based on the LambdaMOO core and incorporates a web client called Xpress. This open source software provides a graphical user interface designed to improve accessibility to a LambdaMOO environment. In LanguageMOO on completion of a simple log in protocol, students are free to communicate with other users and navigate around the virtual space by means of mouse clicks and a simple series of textual commands. A screen capture of the LanguageMOO interface is reproduced below:



The enCore interface gives access to a chat window and series of authoring tools that enable users to create, share and edit virtual objects. Available tools include generic devices such as slide projectors, notes, web pages and rooms. In addition a MOO-based mailer is provided. On obtaining the appropriate level of user privilege, users may also engage in simple object-orientated programming. As a learning support, extensive online help is also available.

The LanguageMOO environment has recently been accessed by undergraduate students in Tokyo and Korea on a trail basis. Preliminary findings indicate that after the first few sessions, students found the enCore interface easy to navigate. Significantly few students attempted to access or utilise the programming features of LanguageMOO. Most subjects preferred to focus on communicating with their peers. As has been noted in the literature, learner discourse in LanguageMOO was characterised by a high incidence of errors. This finding suggests that real time nature of communication in MOOs may produce a high frequency of errors as learners push their linguistic system to its limits. Some evidence was also found of the unique registers found in online communication. Students in this trail made

extensive use of invented words, incomplete sentences and iconic symbols. The initial findings of this trail have been positive, and full scale study of student interaction in LanguageMOO is now underway.

Conclusion

Although research into the use of MOO environments in language education is at an early stage, the findings of existing studies have been encouraging and warrant further investigation. These novel tools offer new opportunities to engage students in the learning process. Future investigations of student interaction in LanguageMOO will attempt to enhance our understanding of the nature of communication in hypermedia and may also provide new perspectives on the nature of second language learning in virtual environments.

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Integration Information Communication Technology in a Virtual Environment

In recent years the Faculty of Law, Business and Arts at the Northern Territory University (NTU) has introduced a new and innovative approach to teaching and learning. In a departure from the more the traditional forms of education, students enrolled in the Certificate, 11, 111 1V (Office Administration) and the Diploma in Business (Administration) course undertake their studies in the virtual office environment of **Crocodylus World Practice Firm**. The practice firm is a "virtual" business that mirrors the form, organization and structure of its business partner - Crocodylus Park at Berrimah in the Northern Territory. This action-based model of learning, with a strong emphasis on the integration of Information Communication Technology (ICT) is designed to equip students with the knowledge, competencies and skills required in the real world of work.

When student enrol in an Office Administration course at NTU they also become "staff" members of the **Crocodylus**

World Practice Firm. As "employees" of the practice firm students learn all aspects of the office environment as well as gain the experience of operating a business. In the simulated small business environment the "staff" trade with national and international practice firms.

There are currently approximately 3500 practice firms trading across the world in countries as diverse as the Ukraine and Canada. Whilst no actual real transfer of goods or money occurs, all other business transactions take place. This simulated virtual economy enables the students to experience the practicalities of the world of business and to integrate, refine and explore business process and transactions. Students take responsibility for clients, they follow the processes of buying and selling and they explore the realities of customer service in a "virtual' business environment.

Information Communication Technology

The use and application of Information Communication Technology (ICT) is an integral aspect of the activities the students engage in. Computer operations are integrated into the day-to-day operational activities of the practice firm. Lectures, tutorials, practical activities and assignments complement the daily tasks undertaken. The practice firm also provides students with experience in graphic design, web page production, and the use of multimedia for presentations, network maintenance, email as well as Microsoft Office applications. The occupational health and safety issues of working with IT and the etiquette of on-line communication also forms an important component of the courses the students undertake.

E-commerce transactions are becoming an increasing component of the business activities students' experience. Virtual on-line trading through the Australian Network of Practice Firms (ANPF) web site enables the students to gain an insight into the area of e-commerce. The ordering, purchasing, and on-line payment of goods prepares students for participation in the emerging world of e-business.

Action Learning in a Virtual Environment

Action learning is a feature of the practice firm. Students learn through practical activities that mirror real world experiences. Action learning is, as Mc Shane and Travaglione indicate, one of the fastest growing forms of experiential learning in the workplace:

> Action learning is considered one of the most important ways to develop …competencies. It involved both tacit and explicit learning, forces employees to diagnose new situations and makes them rethink current work practices. At the same time, the results of action learning potentially add value to the organization in terms of a better work process or service (Mc Shane. S and Travaglione.T, 2002:59)

As employees of the practice firm students also learn the "soft" skills required to be effective and efficient in the real workplace. The development of "soft" skills such as work ethics, teamwork, problem solving, negotiation skills, conflict resolution and general communication skills underpin many of the experiences the students engage in. The development of effective on-line communication skills is also integrated into the operational activities of the practice firm.

Virtual trade fairs are an important feature of the practice firm environment and provide an opportunity for students to meet, interact and "trade" with national and international clients. In June 2002, the NTU hosted the 2002 Top End International Trade Fair at which over 250 participants attended. Practice firms from all Australian states and territories, from Hong Kong, United States of America, Canada, United Arab Emerits and Austria participated. Over 40 exhibition stands showcased the students skills and enabled industry, educational institutions and the public to participate in this innovative educational platform. The use of ICT in the form of web sites, mutli-media displays and interactive learning presentation highlighted both the business applications of Information ICT and its practical application in an educational context.

The ANPF

The Australian Network of Practice Firms (ANPF), which is located at the Canberra Institute of Technology, began in 1995 and is based on a successful European scheme. The ANPF coordinates the establishment, training, support, operations and network of the 145 practice firms currently operating in Australia. Schools, TAFE's, universities and private provider organizations constitute the membership of the ANPF

Learning in a Simulated Environment

In **Crocodylus World Practice Firm** the theoretical aspects of the courses are taught and applied simultaneously. The knowledge the students gain throughout the course is consolidated through practical hands on activities in a non-threatening environment. Competence is demonstrated in a context that reflects the organisational culture and business

environment of the real world.

Students undertaking certificate and diploma courses are assessed according to nationally recognised competency standards. Competency based assessment not only reflects the shift from job-based to competency-based organizations, but it also maximizes the chances that graduates will have the necessary knowledge skills and abilities and be able to implement them in specific work environments. According to Herman, Aguinis and Kraiger (1997):

> …in contrast to traditional forms of evaluation, methods of … [competency based assessment] require that learners apply new concepts to real word problems, display performance publicly, work in social contexts to solve problems, and recognise success criteria that mirror real world complexities.

Formal and informal learning, recognition for prior learning (RPL) and work place assessment are also an important aspect of the business office administration course.

The **Crocodylus World Practice Firm** provides a stimulating environment where students are encouraged to use their own initiative and develop the knowledge, skills and abilities that are required in the real world of work. The students are supported in their learning and provided with a diverse range of experiences that challenge and extend them beyond the confines of a traditional classroom approach. The practice firm environment provides an innovative link between the pedagogy of business administration, the application of ICT in a job context and the realities of the world of work.

In addition, the action-learning, competency-based approach mirrors a growing trend within education to link assessment, instruction, and application. As Herman and Kraiger stated, "In short, real competence involves proper application and demonstration of [knowledge, skills and abilities] within a dynamic environment"(1997).

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Case Study: Exploring Student and Instructor's Perceptions and Interactions in Online Classes

Abstract

This case study explores instructor and learner perceptions and attitudes toward interaction in online courses. Participants include faculty and learners involved with an online course as well as other faculty and learners who have expressed reluctance toward participating in online courses. Analysis of data reveals that although perceptions regarding interaction varied among all interviewed, all participants agreed the level of interactivity was at least adequate for learning.

Introduction

Distance education (DE) is rapidly changing with the growth of new technologies. One of the most recent technologies is online instruction. Interaction is one of the most important instructional elements of online courses. Moore (1989) developed one of the most influential models that deal with interactions. Moore categorizes interactions into three types: learner-content, learner-instructor, and learner-learner interactions. Furthermore, Hillman et al (1994) added a fourth type of interaction called "learner-interface interaction" which occurs when students use technologies to communicate with the content, ideas, and information about course content with the instructor and their classmates. Fulford and Zhang (1993) note that when learners perceive a high level of interaction, they will be more satisfied, but when they perceive low interaction, they are dissatisfied.

Purpose

The purpose of this study is two-fold. First, the researcher intends to gain a deeper understanding of the perceptions shared by learners and faculty who are reluctant to enroll in online courses or those who withdraw early in the experience. Second, the researcher wants to explore instructors' and learners' attitudes and perceptions of interaction, after they experienced an online course.

Research Questions

The research questions of this study are framed by four types of interactions: learner-content, learner-instructor, learner-learner, and learner-interface interactions (Hillman et al., 1994; Moore, 1989).

1. How do learners and faculty (both participants and non-participants of the course) perceive the value of interaction in online courses?
2. What is the nature of the relationship between learner-learner and learner- instructor in the online class?
3. What strategies did the instructional team design to promote interactions?
4. In what ways did the instructional team address learner-interface interactions; and, how did the learners perceive this form of interaction?
5. What pattern of interaction developed?

Methodology

This study was based on data gathered from interviews, online course documents, and computer transcripts. Participants included four faculty (one course instructor and three non-course participants) and 15 learners (seven learners who were enrolled in an online class and eight who either chose not to enroll or withdrew after the first session).

The online course documents included: an analysis of the course syllabus, a participant's guide, and other materials that supported each of the learning activities. Transcripts of online communications captured "threaded" and chat discussions among learners and the instructor.

The analysis of the transcripts used a five-step discussion-analysis technique devised by Henri (1992). Transcripts were reviewed for:

1. Participation—total number of messages (the researcher analyzed the messages or statements of instructor and learners posted on the Webboard and Blackboard).
2. Social cues—learners' messages which Henri defines social messages as a "statement or [a] part of [a] statement not related to [the] formal content of subject matter" (p. 126). Social cues are related to "self-introduction", expressions of feeling, greetings, and combinations of these examples.
3. Interactive—"chain of connected messages" (p. 125) (the researcher analyzed the patterns of the interactions on the chat and discussion boards).
4. Cognitive—knowledge and skills of the learners' messages (the researcher analyzed by studying messages posted on the Blackboard and Webboard).
5. Metacognitive—"knowledge and skills and showing awareness, self-control, and self regulation of learning" (p. 125) (the researcher analyzed the messages in terms of the learners' comparing themselves to other learners' strategies and organizations).

Analysis and Preliminary Results

The interviews revealed the following about the four types of interactions:

- Learner-content—most learners said the content was appropriate for the objectives of the course and was presented in a clear and concise manner.
- Learner-instructor—most learners found their online interactions with the instructor (through the chat room and discussion board) to be very helpful.
- Learner-learner—most learners agreed that interactions with their classmates were very helpful in doing projects and clearing up questions.
- Learner-interface—most learners were satisfied with the technology used in the classroom, such as Blackboard.

Computer Transcripts Analysis

The researcher analyzed the average length of a student's post. For example, in Week 2 and 3, the learners replied to the instructor's messages and posted, on average, 50 words, or about five sentences. On average, learners posted more often during the later weeks than earlier weeks. They were looking for more help in later weeks due to projects and computer/technology–related problems. Also, many needed help in order to implement technology in their teaching.

Most of the messages posted contained the course content, computer and technology skills, and the course projects. Not only did the learners share knowledge, but also content analysis indicated the messages contained discussions of a high-cognitive level. Furthermore, after reviewing the messages each week the researcher was able to distinguish learners' ability levels on both the discussion board and the real-time chat. For example, many introverted learners posted more messages and demonstrated higher cognitive skills in an online discussion board as compared to face-to-face meetings. Also, the students compared the messages posted by the class to get feedback on the technology and tools used in classrooms.

Summary

Analysis of data revealed that although perceptions regarding interaction varied among all interviewed, upon closer analysis, all course participants agreed that the interactivity level was at least adequate. Detailed discussion analysis substantiated these perceptions, showing that deep levels of processing and interactivity were achieved.

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Conference announcements

- **VI International Conference on School and Popular Meteorological and Oceanographic Education**
  Villaviciosa de Odon, Madrid, Spain
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  http://www.uem.es/web/cie/meteoro/index.htm

- **Fourth International Conference on Information Communication Technologies in Education**
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  http://www.ineag.gr/ICICTE

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